



DEPARTMENT OF ENERGY TECHNOLOGY
AALBORG UNIVERSITY

PhD Public Defence

Title: Electrical Design of a New, Innovative Overhead Line Transmission Tower Made in Composite Materials

Location: Pontoppidanstræde 111, auditorium

Time: Wednesday 22 August at 13.00

PhD defendant: Tohid Jahangiri

Supervisor: Professor Claus Leth Bak

Moderator: Professor Birgitte Bak-Jensen

Opponents: Professor Zhe Chen, Dept. of Energy Technology, Aalborg University (Chairman)
Professor Behzad Kordi, University of Manitoba, Canada
Frank Mauseth, NTNU, Gløshaugen, Norway

All are welcome. The defence will be in English.



Abstract:

The overhead transmission lines are undergoing major changes. Power transmission systems, which traditionally are made as large steel lattice structures that were developed over 70 years ago, are very negatively dominant with regards to visual impact. For this reason, public opinion is increasingly and strongly opposing both existing and planned overhead transmission lines. In this regard, a fully composite pylon for 400 kV lines is introduced with unique specifications such as easier to erect, more compact, smaller and better looking than the old ones, which is important to get public acceptance. The electric field distribution around and inside the fully composite pylon is one of the key issues that has been assessed by using numerous finite element analyses. Moreover, the design of appropriate shed profiles for the insulation on the unibody cross-arm is addressed. Another issue in the design process of fully composite pylon is dimensioning internal clearances on the pylon. A comprehensive insulation coordination study is done to determine minimum required air clearances on the unibody cross-arm of pylon. Lightning shielding system of the fully composite pylon is another important issue in the electrical design of pylon. Therefore, a revised EGM is used to evaluate the lightning shielding performance of the pylon. Environmental aspects of fully composite pylon including audible noises, radio noises, corona losses and electromagnetic emissions are also calculated and evaluated.